groups treated of in *The Bryologist,* namely, Dr. Best, the pleurocarpous mosses; Professor Holzinger, the acrocarpous mosses; Dr. Evans, the Hepaticae, and Professor Riddle, the lichens.

HOUGH'S LEAF-KEY TO THE TREES

MR. ROMEYN B. HOUGH has brought out a handy pocket manual which he calls a "Leaf Key to the Trees of the Northern States and Canada." The booklet is of such dimensions that it can be carried very easily in one's pocket, its dimensions being 4½ by 6 inches, and not over a quarter of an inch in thickness. In about thirty pages all of the common native trees from the Rocky Mountains eastward, and north of the latitude of North Carolina, are briefly characterized by means of keys which refer principally to their leaves. With this in hand the tyro ought to find no difficulty in finding the name of any native tree in the region named. It should be especially helpful to young foresters.

SHORT NOTES

A YEAR or so ago W. N. Clute brought out a little "Laboratory Botany" (Ginn) for use in high schools, which should have been noticed long ago. It has already commended itself to teachers as a most useful laboratory guide.

THE crown-gall of plants is discussed very fully and conclusively in Bulletin 213 of the Bureau of Plant Industry, of the United States Department of Agriculture. The authors, Erwin F. Smith, Nellie A. Brown and C. O. Townsend, find that *Bacterium tumefaciens* produces tumors upon many species of plants in widely separate parts of the natural system. Thus peach, apple, rose, quince, chestnut, grape, etc., when attacked by this organism develop the growths known by the name of "crown gall."

Parts III. and IV. of Oakes Ames's "Orchidaceae" continue to maintain the high standard set in the first and second parts. The books are not only of high scientific value to the botanist, but the printing and paper are superb, and when added to the wealth of artistic etchings constitute volumes that any artist might be glad to own. They form a notable addition to the literature of botany.

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SPECIAL ARTICLES

THE POISONOUS EFFECTS OF ALCOHOLIC BEVERAGES NOT PROPORTIONAL TO THEIR ALCOHOLIC CONTENTS

SUCH a vast amount of investigation and discussion has been centered on the liquor problem during the last few years that it seems almost presumptuous to attempt to add any new information to the subject or even to emphasize a point which has been previously recognized but not thoroughly appreciated.

In the report of the investigations made by the sub-committee of the committee of fifty to investigate the liquor problem, Abel[1] states "That more concentrated alcoholic liquors or spirits are, from a practical point of view, the most toxic of all alcoholic beverages. If whiskey or cognac were always to be diluted with water until the percentage of alcohol was brought down to ten per cent., they would be no more toxic than wine of the same strength."

These statements would lead one to infer that if the alcoholic content of all beverages was reduced to the same percentage the toxicity of each beverage would be the same. If true, such a conclusion would greatly simplify the method of determining the relative harmfulness of the many kinds of alcoholic beverages.

Numerous investigators have subjected various living organisms to the influence of pure ethyl alcohol diluted with water and also to beverages which contained varying amounts of it. In general they have obtained definite results showing that alcohol in appreciable quantities is always injurious to living matter.

It is recognized that some species of living organisms are more resistant to the influence of alcohol than others, and also that some individuals of the same species are more resistant than other individuals, but if many indi-

[1] "Physiological Aspects of the Liquor Problem," 1903. A report by the sub-committee of the Committee of Fifty to investigate the liquor problem, edited by John S. Billings, New York.

viduals of any species are subjected to the influence of alcohol it can be determined in general how great an amount of alcohol the species can endure.

In some experiments with rotifers, *Hydatina senta,* to determine the effect of different external influences upon the parent and offspring, various alcoholic beverages have been used and have given very definite results as to their relative toxicity. These experiments are not exhaustive nor complete, but it seems advisable to record them since they demonstrate very clearly that the toxic effect of some of the common alcoholic liquors is not proportional to the amount of alcohol contained in them.

The rotifers are microscopic aquatic animals living in certain kinds of foul water. In the laboratory such water was prepared by placing a small amount of horse manure in a two-quart jar of tap water. This mixture was inoculated with various kinds of bacteria and also with very small flagellated protozoa. In about thirty-six hours the jar was swarming with millions of the small protozoa. A cubic centimeter of this water containing the protozoa was added to nine cubic centimeters of tap water and then adult rotifers were placed in this mixture. They lived in it readily eating the protozoa and laying eggs which developed into mature offspring in about forty-eight hours.

Varying amounts of each alcoholic beverage were added to this water in which the rotifers lived thus causing the toxicity of the whole solution to vary according to the amount of the alcoholic beverage present in the mixture. As an indicator to the toxicity of the beverages thus diluted with the water in which the rotifers lived, two points were noted: (1) the percentage of alcohol present in the diluted beverage at which the animals died within 10–30 minutes; (2) the highest percentage of alcohol present in the diluted beverage at which the females produced apparently normal young.

The following tables give the details of the experiments and bring out clearly the fact that alcohol is not the only cause of the injurious effects produced by alcohol beverages.

If two beverages which contain approximately the same amount of alcohol are compared the poisonous effects of each are sometimes nearly equal as is true of claret and white wine or Holland gin and brandy, but, in other cases, the poisonous effects may be very unequal, as is very clearly shown in the comparison of the second sample of cider and Ballentine's ale. Here the alcoholic contents of each are nearly equivalent but the toxicity of the cider far surpasses that of the ale in both sets of experiments as recorded in Tables I. and II.

TABLE I

Showing the Highest Percentage of Alcohol in the Beverages at which the Rotifers Lived 10–30 Minutes

Beverages	Per Cent. Alcohol by Volume in Original Sample	Per Cent. Alcohol in Diluted Portion of Sample Used	Duration of Life of Rotifers	No. of Individuals Used
Cider	7.5	0.2	25 minutes	10
Cider	6.23	0.4	22–40 "	30
Cider	8.8	0.4	30 "	10
Claret	11.	0.4	30–45 "	50
Claret	9.25	0.5	20 "	20
Port wine	19.65	0.9	30 "	10
Port wine	22.6	1.5	30 "	40
White wine	11.5	0.6	30 "	10
Sherry	20.5	1.5	30 "	40
Sherry	19.25	1.5	30 "	30
Dark beer	5.8	2.	30 "	10
Red star lager beer	3.75	2.	20 "	10
Schlitz beer	5.35	2.	20 "	10
Budweiser lager beer.	4.9	2.	20 "	10
Ballentine's ale	6.3	2.	20–35 "	40
Ballentine's ale	6.3	2.	20–35 "	40
Bass's pale ale	9.25	1.	35 "	10
Bass's pale ale	8.5	1.5	15 "	10
Rye whiskey	46.4	10.	10 "	20
Blend whiskey	44.5	10.	60 "	20
Holland gin	49.	10.	35 "	20
Holland gin	52.	10.	35 "	20
French brandy	50.8	10.	20 "	30
Cooking brandy	53.2	10.	25 "	30
Absolute alcohol	99.5	10.	45–60 "	50

Liquors which contain a high percentage of alcohol may be more toxic or may be less toxic than liquors containing a low percentage of alcohol. Sherry and port wine which contain about twenty parts of alcohol are much more toxic than Schlitz's beer and Ballentine's ale,

both of which contain less than seven parts of alcohol. On the other hand, Holland gin, which contains approximately fifty parts of alcohol is much less toxic than any of the beers or wines which range in their contents from three to twenty-three parts of alcohol. Thus it seems that the total poisonous effects of alcoholic beverages are not entirely caused by alcohol but are due in part to other substances.

TABLE II

Showing the Highest Percentage of Alcohol in the Beverages at which Apparently Normal Young were Produced

Beverages	Per Cent. Alcohol by Volume in Original Sample	Highest Per Cent. Alcohol in Diluted Portion of Sample in which Young were Produced	No. of Females Producing Young
Cider	7.5	.065	10
Cider	6.23	0.1	30
Cider	8.8	0.1	5
Claret	11.	0.3	26
Claret	9.25	0.3	6
Port wine	19.65	0.3	10
Port wine	22.6	0.2	15
White wine	11.5	0.4	10
Sherry	20.5	0.9	14
Sherry	19.25	0.9	10
Dark beer	5.8	1.	5
Red star lager beer	3.75	0.6	6
Budweiser lager beer.	4.9	0.3	20
Schlitz beer	5.35	1.	10
Bass's pale ale	9.25	0.05	10
Bass's pale ale	8.5	0.06	10
Ballentine's ale	6.3	1.	15
Ballentine's ale	6.3	1.	15
Rye whiskey	46.4	2.	10
Blend whiskey	44.5	2.	10
Holland gin	49.	2.	20
Holland gin	52.	2.	20
French brandy	50.8	2.	20
Cooking brandy	53.2	2.	30
Absolute alcohol	99.5	3.–4	50

In further support of this statement a few additional experiments of a somewhat different nature were made. A certain quantity of both claret and sherry were placed upon a steam radiator and allowed to evaporate. In both cases a residue remained. As soon as this residue was thoroughly dried distilled water was added until the original volume was restored. Then each solution was diluted in the same manner as the liquors which contained alcohol. Rotifers were placed in various dilutions of these solutions and the results compared with those obtained from the liquors containing alcohol.

TABLE III

Showing the Comparative Acute Toxicity of Claret and Sherry with and without Alcohol

Beverage	Alcohol in Diluted Portion of Beverage Used	Duration of Life of Rotifers	Alcoholless Liquor Diluted in same Proportion as the Alcoholic Liquor	Duration of Life of Rotifers	No. of Individuals used in each Experiment
Claret	1%	8–10 min.	1%	30 min.	40
Sherry	2%	15 min.	2%	60 min.	40

TABLE IV

Showing the Comparative Toxicity of Claret and Sherry with and without Alcohol in Dilutions of which Young Rotifers were Produced

Beverages	Highest Per Cent. Alcohol in Diluted Liquor in which Young were Produced	Highest Per Cent. Alcoholless Liquor in which Young were Produced. Diluted in same Manner as the Alcoholic Liquor	No. of Individual used in each Experiment
Claret	0.3	0.7	25
Sherry	0.9	1.5	25

The acute toxicity of claret and sherry which have the alcohol removed is much less than in the cases where the alcohol is present. Even with the alcohol removed claret is much more toxic than the alcoholless sherry and each of them is more toxic than absolute alcohol. The same fact is shown in the experiments where young rotifers were produced as is indicated in Table IV.

If alcohol is the only toxic ingredient of claret and sherry neither of them ought to produce poisonous effects upon rotifers after the alcohol is removed. These experiments, however, show that these two liquors are very toxic even when they contain no alcohol.

Tables I. and II. show that the wines are strikingly more toxic than the same percentage of absolute alcohol. Chittenden[1] found that wines had a greater inhibitory action on salivary and pancreatic digestion than did a cor-

responding percentage of absolute alcohol. This he states is due to their acid properties.

Malt beverages, as ales and beers, he states, also have a retarding influence on salivary and pancreatic digestion due to their acidity but it is less marked than it is in the wines. Both of the above tables show that some of the ales and beers are decidedly less toxic than the wines. Some of them, however, were as poisonous as the wines in the experiments where young were produced, but in the 10–30 minutes experiment on acute toxicity only Bass's ale equaled the toxicity of any of the wines. Its toxicity was the highest of all the malt beverages but it did not exceed the lowest toxicity of the wines.

The distilled beverages, whiskey, gin and brandy, were conspicuously less poisonous in both sets of experiments than either the wines or malt beverages. This is probably due to the fact that in the distilling process of their manufacture the volatile substances are separated from the non-volatile and perhaps toxic materials and are subsequently used in the making of the liquors. These distilled liquors approached the point of toxicity of absolute alcohol which was the least poisonous of all the alcoholic solutions used. Because of its purity it served as a control with which all the other beverages can be compared.

In a comparison it is readily seen that the wines are the most toxic, the malt liquors stand second in point of toxicity, and lastly the distilled liquors are the least toxic of all the beverages and approach nearest to the toxicity of absolute alcohol.

The value of these experiments is to show again that in the three main kinds of alcoholic beverages there are other important toxic ingredients than ethyl alcohol and also to demonstrate that the various alcoholic liquors when reduced to the same percentage of alcohol differ widely in their point of toxicity.

The results perhaps explain why different alcoholic beverages have such different effects upon the drunkard even though an equal intoxication is produced. It is generally recognized that brandy produces a certain type of drunkenness and that cider produces another type differing widely from the brandy type. Many of the other liquors also produce a particular type of drunkenness the characteristics of which are typical for each liquor. These types of drunkenness are doubtless partly caused, at least, by the non-alcoholic ingredients in the liquors.

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MIDDLETOWN, CONN.,
February 28, 1911

BIOLOGICAL SOCIETY OF THE PACIFIC COAST

THE first meeting of a new society for Pacific coast biologists was held on April 1 at Berkeley, California. An afternoon meeting, at which papers were presented by President Jordan and Professor Zinsser, of Stanford University, and Professors Kofoid and Maxwell, of the University of California, was followed by a dinner at the Hotel Shattuck, and by participation, in the evening, in a joint general public meeting of the newly organized Pacific Coast Association of Scientific Societies. At this meeting addresses were made by Presidents Wheeler and Jordan, of California and Stanford universities, Professor Kellogg, of Stanford University, and Mr. George Dickie, marine engineer, of San Francisco.

The Biological Society of the Pacific Coast begins with an active membership of seventy, representing California, Washington, Oregon, Arizona and Utah. Three meetings will be held each college year, of which one will be known as the annual meeting and will be held in conjunction with the meetings of the various other societies composing the Pacific Coast Association of Scientific Societies. The officers of the society for 1911–12 are: Professor Vernon L. Kellogg, president; Professor H. B. Torrey, secretary-treasurer, and Professor H. J. Maxwell, third member of the executive committee.

SOCIETIES AND ACADEMIES

THE HELMINTHOLOGICAL SOCIETY OF WASHINGTON

THE fourth regular meeting of the society was held at Dr. Stiles's residence on February 9, 1911, Dr. Stiles acting as host and Dr. Pfender as chairman.

Mr. Foster presented a note on a nematode from the stomach of the pig. This form had been provisionally identified as *Spiroptera strongylina*,